

Species generis *Euphorbiae* Imperii Japonici (I)

auctore

I. HURUSAWA

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Finis hujus opusculi est conspectum et brevem expositionem *Euphorbiarum* patriae meae Coream inclusam efficere. Materiae hujus studii usurpatae in Herbario Universitatis Imperialis Tokyoensis conservatae sunt.

Primo enim gratias maximas agere debeo Prof. T. NAKAI, qui benigne me opusculum hoc conficere duxit. Deinde autem viri illustrissimi, quorum specimina herbarii in mea dissertatione admodum me adjuverent, beneficium maximum memoro.

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Locus systematicus generis Euphorbiae

The genus *Euphorbia* is situated in the tribe *Euphorbieae* BOISSIER (*Euphorbiea* BARTL.) as follows:

- | | | | |
|-----|---|---|----|
| 1 { | Flores masculini calyces ferentes | <i>Anthostema</i> A. JUSS. et | |
| | | <i>Dichostema</i> PIERRE. (Utraque Africae tropicae) | |
| | Flores masculini calycibus carentes | | 2. |
| 2 { | Cyathia zygomorpha | <i>Pedilanthus</i> NECK. (America centralis), | |
| | | <i>Monadenium</i> PAX. (Africa) et <i>Stenadenium</i> PAX. (Africa) | |
| | Cyathia actinomorpha | | 3. |
| 3 { | Fructus drupaceus | <i>Elaeophorbia</i> STAPF. (Africa tropica) | |
| | Capsula | | 4. |
| 4 { | Glandulae involucri connatae | <i>Synadenium</i> BOISS. (Africa) | |
| | Glandulae involucri liberae | | 5. |
| 5 { | Bracteolae florum masculinorum latae | <i>Calycoplepus</i> PLANCH. (Australia) | |
| | Bracteolae florum masculinorum angustae vel obsoletae raro nullae | | 6. |

- 6 { Cyathia unius strati *Euphorbia* LINN.
 { Cyathia duorum vel plurium stratorum *Diplocyathium* SCHMIDT

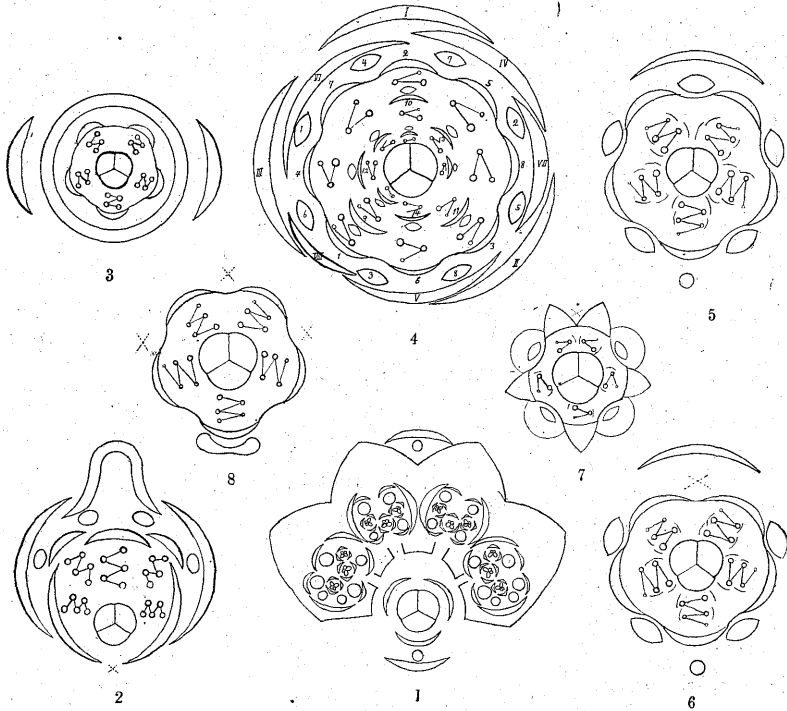


Fig. I. Diagrams of genera of the tribe *Euphorbieae*.

1. *Anthostema*. 2. *Pedilanthus*. 3. *Synadenium*. 4. *Diplocyathium*.
 5-8. *Euphorbia*. 5. *Euphorbia* subgen. *Euphorbium* (pro parte) & *Euphorbia adenochlora*. 6. *Euphorbia* subgen. *Esula* (pro maxim. parte).
 7. *Euphorbia* subgen. *Chamaesyce*. 8. *Euphorbia* subgen. *Poinsettia*.

Character generis essentialis et naturalis atque vegetationis

Special inflorescence, cyathium, which is essentially actinomorphic, provided that usually by the reduction of a nectary, a corner of the involucre is missing. (Fig. I, 6, 7 and 8.)

One female flower and several (often many) male flowers enveloped in the involucre as shown in the diagram, (Fig. I, 5-8.) rarely dioecious.

Fruit: Capsule in all subgenera (with this character this genus is distin-

guished from the allied genus, *Elaeophorbia* bearing drupe.) ; septicidally and simultaneously loculicidally tardily or elastically dehiscent, with only a few exceptions such as *E. acenocarpa* etc.

Nectary of the involucre appears in exceedingly various forms (and that with intermediate forms), without appendage or with it in the different grades. This occurrence or absence of appendage is sometimes used for the separation of small genera.

Seed: has caruncle of aril sort, or not. Globose or somewhat polyhydral, smooth, rugose or variously sculptured.

Stem: principally dichotomous, although in the anthocladium we find various modifications such as umbella, glomerule or capitulum; generally has a tendency to abbreviate as seen in cyathium. The transitional abbreviation of main stem from the subgenus *Esula* sect. *Helioscopiae* through the subgenus *Agaloma* to the subgenus *Chamaesyce* is to be observed. The maximum development of it is visible in the succulent tropical plants.

Leaf: Cauline leaves and peculiar floral leaves. In the subgenus *Chamaesyce* the former is almost entirely undeveloped and the latter contrarily well developed. The group of subgen. *Agaloma* forms an intermediate form. In the subgenus *Euphorbium*, which is only cultivated in our country, the cauline leaves are reduced to spines or thorns; floral ones are only seen in the terminal anthocladium.

The plant of subgen. *Esula* possesses both of them.

Root and rhizome: very variable in both habits and forms; perennial very stout rootstock or long creeping rather slender rhizome, or annual meagre fibrous root. The degeneration from "perennial" to "annual" concords with the poor or luxuriant growth of the anthocladium, or the scanty or abundant production of seeds.

It occurs salient oecological adaptation in *Euphorbia*, viz. the plants of subgen. *Esula* possess perennial rhizome and grow in woods or on hills, while the annual plants of subgen. *Chamaesyce* grow in arid places or arenaceous wilderness and product numerous seeds; and lastly the succulent plants prevail in the African desert.

The genus has been occasionally separated into several small genera by the

names of their own. But characters chosen for generic ranks are the natures of vegetative organs, which are mingled and dissolve into the same type. Whether carunculate or not of the seeds is also linked by many intermediate forms. The section *Tithymalus* (of BOISSIER), in a wide sense, includes both carunculate and noncarunculate group.

At present, I should like to consider those small genera as subgenera, unless phylogenetic unchangeable characters are found by farther observations.

Conspectus subgenerum generis Euphorbiae

- A.) Planta succulenta, ramis carnosis vel lignosis perennantibus. Folia caulina genuina minima vel valde reducta obsoleta, interdum in spicas etc. transformantia. Glandulae involucri saepissime exappendiculatae.
 - a.) Ramus carnosus. Folia floralia adsunt. Stipulae nullae vel spinas formantes Subgen. *Euphorbium* (ISNARD)
(Plantae Africae tropicae: in Japonia cultae.)
 - b.) Ramus lignosus. Folia floralia destituta. Stipulae glanduliformes.
..... Subgen. *Arthrothamnus* (KLOTZSCH et GARCKE)
(Plantae Capenses et Americae tropicae.)
- B.) Caules et rami non rite carnosi annui, si planta perennis, praeter radicem vel rhizomata annua.
 - a.) Anthocladia (vel synflorescentia) cymoso-ramosa, ramis natale e dichasio constitutis. Glandulae involucri 4-5 liberae.
 - 1.) Caulis primarius verus vulgo ramos floriferos superans. Folia caulina genuina floralibus praedominata. Glandulae involucri exappendiculatae. Semina carunculata Subgen. *Esula* (PERSOON)
 - 2.) Caulis primarius verus reductus vel fere destitutus, eius loco rami floriferi (anthocladia) frequentes. Stipulae interpetiolares adsunt. (in nonnullis destitutae.) Glandulae involucri appendiculatae. Semina ecarunculata. (rarissime carunculata.)
 - i.) Folia caulina vera quamquam pauca adsunt. Stipulae interpetiolares minutae vel nullae. Appendices glandularum saepissime insignes Subgen. *Agaloma* HOUSE
(praesertim Americanae.)
 - ii.) Folia caulina vera destituta sed juventute nonnulla (vulgo 2-4) in extrema basi caulis inter cotyledones evoluta, ex quibus axillis

anthocladia evoluta. Folia ramorum floriferorum (anthocladiorum) asymmetrica basi obliqua. Stipulae interpetiolares semper evolutae Subgen. *Chamaesyce* RAFINESQUE. (Pantropicae)

- b.) Anthocladia (synflorescentia) pseudo-dichotome ramosa flexuosa, cyathiis alternatim dispositis. Glandulae involugri cum nonnullis emarcidis 1-2, si 2, in 1 connatae. (raro 4.) Subgen. *Poinsettia* (GRAHAM) HOUSE.
(Plantae in America centrali endemicae: nostrae cultae.)

Euphorbia subgenus **Euphorbium** (ISNARD) m. comb. nov.

Euphorbium ISNARD in Mem. Acad. Sci. 384. (1720) (fide BOISSIER in DC., Prodr. XV-2, 85.)

Euphorbia L., Sp. Pl. ed. 1. I, 450. (1753) tantum * Fruticosae aculeatae et * Fruticosae inermes pro parte.

Euphorbia HAWORTH, Synop. Pl. Succul. 126. (1812); KLOTZSCH et GARCKE in LINN., Natürl. Pflz.-kl. Tricoc. 47. (1860); SMALL, Fl. South-East. U. S. 715. (1903).

Anthacantha LEM. in Illustr. Hort. v, 69. (1855).

Sterigmanthe KLOTZSCH et GARCKE in Monatsber. Acad. Berlin 25. (1859) (fide PAX et K. HOFFM. in ENGL., Pfl.-fam. ed. 2. 19 c, 214).

Euphorbia L. sect. *Goniostema* BAILLON in Adansonia, Rec. Obs. Bot. I, 114. (1861); BOISSIER in DC. l.c. 85. (1862); BERGER, Sukk. Euphorb. 126. (1907).

Euphorbia sect. *Diacanthium* BOISSIER l.c. 78.; PAX in ENGLER Bot. Jahrb. XXXIV, 63. (1905); BERGER l.c. 30. (1907); PAX et K. HOFFMANN in ENGLER, Pflz.-fam. ed. 2. 19. c. 214. (1931) (uti sect. *Euphorbium* subsect. *Diacanthium*).

Eupharbia sect. *Euphorbium* BOISSIER l.c. 85. (1862).

Euphorbia sect. *Tirucalli* BOISSIER l.c. 94. (1862); BERGER l.c. 21. (1907).

Euphorbia sect. *Euphorbium* BENTHAM in BENTHAM et HOOKER, Gen. Pl. II, 260. (1880) sensu quam BOISSIER latiore i.e. incl. *Goniostema*, *Diacanthium* et *Tirucalli*; PAX in ENGLER, Pflz.-fam. III-5, 108. (1896); H. L. SCHMIDT in Beih. Bot. Centralbl. XXII-1, 25. et 29. (1907) (uti "Untergattung *Euphorbium* BENTH."); PAX et K. HOFFM. in ENGLER l.c. ed. 2. 19. c. 213. (1931) excl. subsect. *Arthrothamnus* et subsect. *Pteroneureae*.

Euphorbia sect. *Anthacantha* BERGER l.c. 88. (1907).

Praeterea CROIZAT facit ab *Euphorbia* * *Tithymalus* (nec TOURNEFORT nec MILLER) PERSOON, Synop. Pl. II-1, 10. (1806) sequentem combinationem:

Euphorbia subgenus *Tithymalus* PERSOON sic CROIZAT in Philip. Journ. Sci. LXIX. no. 3. 259. (1939).

The system of this subgenus is here not discussed and all cultivated species in our country were excluded.

1) ***Euphorbia Tirucalli*** LINN., [Hort. Ups. 139. (1748)] Sp. Pl. ed. l. I, 452. (1753); BENTHAM, Fl. Hongk. 301. (1861); BOISSIER in DC. l. c. 96. (1862); MAXIM. in Mém. Biol. XI, 833. (1883); HOOKER f., Fl. Brit. Ind. V, 254. (1887); FORBES et HEMSLEY in Journ. Linn. Soc. XXVI, 418. (1894); HENRY, List Pl. Formos. 82. (1896); MATSUMURA et HAYATA, Enum. Pl. Formos. 367. (1906); BERGER, Sukk. Euphorb. 22. (1907); MATSUMURA, Ind. Pl. Jap. II-2, 305. (1912); HAYATA, Gen. Ind. Pl. Formos. 66. (1917); MAKINO et NEMOTO, Fl. Jap. 653. (1931); NEMOTO, Fl. Jap. Suppl. 426. (1936); MASAMUNE, Short Fl. Formos. 120. (1936).

Euphorbia viminalis (non BURM. f.) MILLER, Gard. Diet. ed. VIII. n. 15. (fide Index Kew.)

Nom. Jap.: *Midori-sango* vel *Ao-sango*.

Hab. in Formosa, prov. Takao, in litore.

Distr. Asia tropica (India, Zeylania, Java, Molucca et Philippin) et Africa orient (in litore vel desertis).

***Euphorbia* subgenus *Esula* (PERSOON) n. comb. nov.**

Euphorbia LINN. {Gen. Pl. ed. l. 152. no. 429. (1737) p. p.} Sp. Pl. ed. l. I, 450. (1753) p. p., i. e. tantum "umbella tri-, quadri-, quinque- et multi-fida."; Gen. Pl. ed. 5. 208. no. 536. (1754) p. p.; ed. 6. 243. no. 609. (1764) p. p.; Syst. Nat. ed. 10. II, 1047. no. 536. (1759) p. p.; ed. 13. III, 330. no. 609. (1771); MURRAY, Syst. Veg. ed. 13. 373. (1774) p. p.; ed. 14. 449. (1784) p. p.; GLEDITSCH, Syst. Pl. 106. (1764) p. p.; ALLIONI, Fl. Pedem. I, 283. (1785) p. p.; JUSSIEU, Gen. Pl. 385. (1789) p. p.; SCHREBER, Gen. Pl. 326. no. 832. (1789) p. p.; DESFONTAINES, Fl. Atl. I, 376. (1798) p. p.; J. ST. HILAIRE, Expos. Fam. Nat. II, 277. (1805) p. p.; SPACH, Hist. Nat. Veg. II, 530. (1834) p. p.; ENDLICHER, Gen. Pl. II, 1108. n. 5766. (1840).

Tithymalus⁽¹⁾ {TOURNEFORT, Instit. rei. Herb. 85. tab. 18. (1700)} HILL, Brit. Herb. 148. pl. 22. fig. 1-6. (1756); ADANSON, Fam. Pl. II, 355. (1763); VAN HALLER, Hist. Stirp. indig. Helv. inch. II, 7. (1768); SCOPOLI, Fl. Carniol. I, 332. (1771)⁽²⁾; *Tithymalus* ADANS. sic SMALL, Fl. South-East. U. S. 718. (1903); BRITTON et BROWN, Illustr. Fl. N. U. S. & Canada ed. 2. II, 471. (1913).

Euphorbia ** *caule uniformi frutescente erecto* etc. PERSOON, Synop. Pl. II-1, 11. (1806) p. p., i.e. tantum *E. dendroides* L. etc.

Euphorbia **** *Esula* PERSOON l. c. 14. (1806)⁽³⁾.

Galarhoeus HAWORTH, Synop. Pl. Succul. 143. (1812); SMALL, Manual South-East. Fl. 800. (1933); HARA in Journ. Jap. Bot. XI-5, 382. (1935); HONDA, Nomina Pl. Jap. 192. (1939).

Esula HAWORTH l. c. 153. (1812).

Charasias S. F. GRAY, Nat. Arrang. Brit. Pl. II, 259. (1812) hic incl. *Euphorbia* *Charasias* L. etc. *foliis floralibus basi connatis*.

Euphorbia sect. II. *Tithymalus* TOURN. apud DUBY, Botanicon Gallicum I, 412. (1828).

Euphorbia § *Tithymalus* TOURNEFORT ex LINDLEY, Synop. Brit. Fl. ed. 1. 220. (1829); MUTEL, Fl. Franc. III, 150. (1836).

Euphorbia B. *Tithymalus* ex REICHENBACH, Fl. Germ. Excurs. III, 755. (1832).

Euphorbia sect. II. *Tithymalus* KOCH, Synop. Fl. Germ. et Helv. 627. (1837); *Euphorbia* sect. II. *Tithymalus* KOCH sic LEDEBOUR, Fl. Ross. III.

(1) Excl. *Tithymalus* sensu MILLER, Garden. Diet. Abridg. ed. III, Ti. (1754) uti syn. *Pedilanthi*. Excl. *Tithymalus* MILL. sic SMALL, Manual SE. Fl. ed. 2. 804. (1933).

(2) Whereabout, we find *Euphorbia* subgenus ("Untergattung") *Tithymalus* SCOPOLI ex H. L. SCHMIDT, (Entwickl. Blüten etc. von *Euphorb.* & *Diplocyath.*) in Beih. Bot. Centralbl. XXII-1, 34. (1907), however, SCOPOLI did not use the rank of the subgenus. So the subgenus ("Untergattung") of SCHMIDT is that of his own so far as he has not mentioned any synonyms or references.

(3) Excl. *Euphorbia* subgen. *Tithymalus* PERSOON [sensu *Euphorbia* sect. *Diacanthium* 2. *Grandifoliae* BERGER, Sukk. Euph. 34. (1907)] sic CROIZAT in Philipp. Journ. Sci. 69. No. 3. 295 (1939)—PERSOON has not made a combination of subgenus *Tithymalus*, though I understand that Dr. CROIZAT complies conceptually with PERSOON's opinion, not particular about formality of the rank.

fasc. X, 558. (1850).

Euphorbia sect. III. *Esula* ROEPER apud DUBY, Bot. Gall. 114. sic KOCH l. c. 630. (1837)¹⁾; LEDEBOUR l. c. 569. (1850) uti KOCH l. c.

Euphorbia sect. *Tithymalus* BOISSIER in DC. Prodr. XV-2, 99. (1862) excl. § 4. *Ipecacuanhae* et § 5. *Laurifoliae* (: semine ecarunculato.); Fl. Orient. IV, 1082. (1879); BENTHAM in BENTH. et HOOK., Gen. Pl. III, 260. (1880); PAX in ENGLER, Pflz.-fam. III-5, 109. (1896); PAX et K. HOFFMANN in ENGLER l. c. ed. 2. 19. c. 216. (1931) excl. subsect. nonnull. ut in BOISSIER.

Originem ducet ab *Euphorbia* **** *Esula* PERSOON l. c.

Typus: *Euphorbia Esula* LINN.

Herbae vel suffrutices lactiferae, caule non aculeato generatim haud, sed interdum satis, carnosio fere semper annuo. Folia caulina sparsa alterna raro in sectionibus nonnullis decussata vel verticillata; umbellaria 3~∞ radiata, saepius 5-fida; floralia ternata vel saepius bifida vulgo libera interdum connata (sicut *E. Charasias*.) pagina symmetrica sed rarius in sect. *Helioscopis* asymmetrica.

Inflorescentia cyathium formans. Synflorescentia (anthoeladia) ex cyathiis composita, ramis cymoso 2-5 fidis, cymis semel, bis vel multoties dichotomis interdum trichotomis. Involuerum campanulatum cyathiforme regulare vel subregulare, lobis 5 ovatis vel oblongis integris vel denticulatis interdum fimbriatis, quibus glandulis alternis 5 vel cum glandula quinta emarceida 4 exappendiculatis margine aut integris ad vix repandis aut lunulatis bicorniculatis interdum exteriore pectinatis, flores masculinos et florem femineum includens, raro flore femineo carens. Bracteolae inter flores masculinos interpositae, vel cum latera interiore involucri adhaerentes, apice laceratae vel plumosae interdum obsoletae rarissime omnino reductae. Flos femineus ante anthesin ab involuero obtectus, longissime pedicellatus demum exsertus et nutans. Ovarium semper triloculare; capsula septicida et simul loculicide dehiscens. Styli tres ab ovario distincti inter se plus minus coaliti vel fere liberi, apice incrassati vel graciliter stigmatosi, stigmatibus saepissime bifidis. Semina albuminosa semper carunculata, facie laevia vel diverse sculpturata.

(1) But in DUBY's Botanicon Gallicum I, 414. (1828), this sectional name is used as follows: *Euphorbia* sect. *Tithymalus* TOURN. 2. *Esula* (ROEP. ined.).

Conspectus sectionum et subsectionum subgeneris Esulae, quae in hoc opusculo inclusae simul exclusae sunt.

- A.) Species annuae vel biennes. Radix tantum subtiliter fibrosa. Semina reticulata, foveata vel foveolata, rugosa vel rugulosa, interdum sulcata vel tuberculata.
- a.) Folia caulina decussata Sect. *Decussatae*. (Plantae cultae)
- b.) Folia caulina genuina sparsa alterna quam floralia pauciora, saepe omnia post anthesis cito delapsa. Folia floralia eius loco praedominata, saepius basi obliqua uti subgen. *Chamaesyce* Sect. *Helioscopiae*.
- 1.) Glandulae involucri integrae. Capsulae laeves vel minute tuberculato-vel irregulariter rugosae vel verrucosae. Semina elevati-reticulata. Subsect. *Euhelioscopiae*.
- 2.) Glandulae involucri bicorniculatae. Capsulae vulgo laeves. Semina foveolata vel plus minus grosse foveata. Subsect. *Foveospermae*.
- B.) Species perennes, (vel rarissime biennes). Radix incrassata; saepe planta rhizomata.
- a.) Semina foveolata. Capsulae laeves interdum plus minus rugosae. Glandulae involucri bicorniculatae vel exteriore pectinatae. Folia caulina alterna numerosa. Planta rhizomata, caulibus pluribus fasciculatis. Quasi intermedia inter sect. *Helioscopias* et sect. *Esulam*. Sect. *Chamaesulae*.
- b.) Semina laevia. Folia caulina genuina alterna sparsa, vulgo floralia praestantia. Planta rhizomata vel fere erihizomata cum radice crassato tuberem formans, ex eius apice per gemmam adventitiam innovationem agit. Sect. *Esula*.
- 1.) Folia caulium fertiliū superiora verticillata ut in umbellaribus. Bracteolae inter flores masculinos saepe valde reductae. Rhizoma magis incrassatum carnosum. Subsect. *Verticillatae*.
- 2.) Folia caulina alterna patula.
- i.) Planta graciliter longe vel breve rhizomata, raro fere erihizomata. Glandulae involucri lunulatae bicorniculatae (raro exteriore subpectinatae). Capsulae laeves vel sub lente tuberculatae. Radii umbellae et ramuli floriferi saepissime dichotomi. Subsect. *Euesulae*.
- ii.) Planta rhizomata, rhizomatibus valde incrassatis elongatis vel caudicem incrassatum abbreviatum formantibus, ex qua radicem

veram incrassatam fusiformem verticali emittit. Glandulae involucri integrae non corniculatae. Capsulae laeves vel saepe verrucosae interdum pilosae. Radii umbellae et ramuli floriferi primo vulgo trifidi dein difidi. Subsect. *Galarrhoei*.

Euphorbia subgen. **Esula** sect. **Decussatae** (BOISSIER) m. comb. nov.

Euphorbia * *umbella quadrifida* etc. LINN., Sp. Pl. ed. 1. I, 457. (1753) tantum *Euphorbia Lathyris* sic LINN.

Euphorbia sect. *Tithymalus* auct. plur. quoad *Euphorbia Lathyris* L.

Tithymalus (TOURNEFORT) VAN HALLER, Hist. Stirp. indig. Helv. inch. II, 7. (1768) tantum *Tithymalus Lathyris*.; SCOPOLI, Fl. Carniol. I, 332. (1771).

Galarrhoeus HAWORTH, Synop. Pl. Succul. 143. (1812) quoad *Galarrhoeus Lathyris* HAWORTH.

Euphorbia sect. II. *Tithymalus* Tourn. § 2. *Esula* (ROEP. ined.) apud DUBY, Bot. Gall. I, 414. (1828) tantum *Euphorbia Lathyris* L.

Euphorbia sect. III. *Esula* ROEPER apud DUBY, Bot. Gall. I, 114. sic KOCH, Syn. Pl. Germ. & Helv. 630. (1837) tantum *Euphorbia Lathyris* L.; LEDEBOUR, Fl. Ross. III, fasc. X, 569 (1850) tantum *Euphorbia Lathyris* L.

Euphorbia sect. *Tithymalus* § 1. *Decussatae* BOISSIER in DC., Prodr. XV-2, 99. (1862); PAX in ENGLER, Pflz.-fam. III-5, 110. (1896); PAX et K. HOFFMANN in ENGLER, Pflz.-fam. ed. 2. 19 C, 218. (1931).

Epurga FOURR. in Ann. Soc. Linn. Lyon Nouv. sér. XVII, 150. (1869) genus monotypicum.

Folia caulina decussata. Umbella 4-radiata, radiis dichotomis. Involucra 4-glandulifera, glandulis longe bicorniculatis. Pericarpium capsulae spongiosum. Semina reticulato-scabra, carunculis stipitatis. Cotyledones lineares.

2) **Euphorbia Lathyris** LINN., Sp. Pl. ed. 1. I, 457. (1753) (*E. Lathyris* sic LINN.); THUNBERG, Fl. Jap. 196. (1784); AITON, Hort. Kew. ed. 1, II, 140 (1789); ed. 2, III, 164. (1811); HOOKER et ARNOTT, Bot. BEECHY. Voy. 44. (1836); LEDEBOUR, Fl. Ross. III, fasc. X, 572. (1850); BOISSIER in DC., Prodr. XV-2, 99. (1862); MIQUEL in Ann. Mus. Bot. Lugd.-Bat. III, 125. (1867); FRANCHET et SAVATIER, Enum. Pl. Jap. I, 420. (1875); MAXIM. in Mém. Biol. XI, 833. (1883); FORBES et HEMSLEY in Jour. Linn. Soc. XXVI, 415.

(1894) sub notat.; HAYATA in Journ. Coll. Sci. Tokyo XX-3, 65. et Tab. IV, F. (1904).

Lathyrus major BAUH., Pin. 293. (1623).

Tithymalus Lathyris HILL, Hort. Kew. 172. (1768); SCOPOLI, Fl. Carn. ed. 2. I, 332. (1772); LAMARCK, Fl. Franc. III, 94. (1778); SMALL, Fl. South-East. U. S. 718. (1903).

Galarhoeus Lathyris HAWORTH, Synop. Pl. Succul. 143. (1812); SMALL, Manual South-East. Fl. 801. (1933); HARA in Journ. Jap. Bot. XI-6, 386. (1935); HONDA, Nom. Pl. Jap. 192. (1939).

Euphorbia spongiosa LEDEB. ex SCHRANK in Syll. Ratisb. I, 214. (1824).

Epurga Lathyris FOURR. in Ann. Soc. Linn. Lyon. Nouv. sér. XVII, 150. (1869).
Nom. Jap.: *Horuto-so*.

Hab. Culta in Honsyu, Kyusyu etc.

Distr. In Europa australi (e Italia media ad Botzen) spontanea. Introducta in Anglia, Gallia, Lusitania, Mexico, Peruvia et Abyssinia etc.

Euphorbia subgen. **Esula** sect. **Helioscopiae** m. sect. nov.

Tithymalus (TOURNEF.) VAN HALLER, Hist. Stirp. Helv. II, 7. (1768) pro parte; SCOPOLI, Fl. Carniol. ed. 2. I, 332. (1772) pro parte.

Euphorbia **** *Esula* PERSOON, Synop. Pl. II-1, 14. (1806) pro minim. parte.

Galarhoeus HAWORTH, Synop. Pl. Succul. 143. (1812) p. p.

Esula HAWORTH l. c. 153. (1812) p. p.

Euphorbia II, E. exstipulatae etc. A.) Glandulae involucri suborbiculatae etc. a.) semina reticulato-exsculpta. ROEPER, Enum. Euphorb. 59. (1824)¹⁾ et B.) Glandulae involucri triangulares, lunato-bicornes etc. ROEPER l. c. 63. (1824) pro parte.

Euphorbia sect. *Tithymalus* auct. plur. p. p.

Euphorbia sect. *Tithymalus* § 9. *Galarrhoei* BOISSIER in DC., Prodr. XV-2, 113. (1862) p. p. et § 10. *Esulae* BOISSIER l. c. 138. (1862) p. p.

Euphorbia sect. *Tithymalus* subsect. *Galarrhoei* BOISSIER ex PAX in ENGLER,

(1) in observ. per ROEPER ipse "sectio" dicitur.

Pflz.-fam. III-5, 109. (1896) p. p. et subsect. *Esulae* BOISS. ex PAX l. c. 110. (1896) p. p.; PAX et K. HOFFMANN in ENGLER, Pflz.-fam. ed. 2. 19. C. 219. subsect. 10. (1931) p. p. et l. c. 220. subsect. 11. (1931) p. p.

Euphorbia sect. *Tithymalus* BENTHAM in BENTH. et HOOK., Gen. Pl. III, 260. (1880) p. p.

Euphorbia § sect. *Tithymalus* NORTON, Rev. Euphorb. N. Mexico, 5 (1899) p. p.

Tithymalus ADANS. apud SMALL, Fl. South-East. U. S. 718. (1903) p. p.

Typus: *Euphorbia Helioscopia* LINN.

Species annuae vel biennes. Radix haud incrassata sed subtiliter fibrosa. Semina reticulata, foveolata vel foveata, rugosa vel regulosa. Folia caulina quam floralia pauciora, interdum omnia post anthesin cito delapsa. (Hic grex ingeniis supra scriptis ad subgen. *Agalomam* appropinquat.) Radii umbellae caule vero praevalent; folia floralia caulinis magis praedominata, saepius basi obliqua uti subgenus *Chamaesyce*. Planta vulgo helioscopiae.

Sect. **Helioscopiae** subsect. **Euhelioscopiae** m. subsect. nov.

3) ***Euphorbia Helioscopia*** LINN., Sp. Pl. ed. 1. I, 459. (1753); ed. 2. I, 658. (1762); AMOEN. Acad. III, 124. (1756); POLLICH, Fl. Palest. II, 18. n. 458. (1777); THUNBERG, Fl. Jap. 197. (1784); WILLD., Sp. Pl. II-2, 914. no. 98. (1799); ROEPER, Enum. Euphorb. Germ. et Pann. 59. (1824); REICHENBACH, Icon. Fl. Germ. v. V-8, fig. 4752. (1841); LEDEBOUR, Fl. Ross. III, fasc. X, 562. (1850); A. GRAY in NATT. PERRY Exped. China-sea & Jap. II, append. 318. (1857); BENTHAM, Fl. Hongk. 301. (1861); BOISSIER in DC., Prodr. XV-2, 136. (1862); Fl. Orient. IV, 1107. (1879); MIQUEL in Ann. Mus. Bot. Lugd.-Bat. III, 126. (1867); A. GRAY, Manual Bot. N. U. S. ed. 5. 434. (1867); ed. 6. 456. (1889); FRAN. et SAV., Enum. Pl. Jap. I, 422. (1875); MAXIM. in Mél. Biol. XI, 838. (1883); HOOKER f., Fl. Brit. Ind. V, 263. (1887); FORBES et HEMSLEY in Journ. Linn. Soc. XXVI, 413. (1894); BRITTON et BROWN, Illustr. Fl. N. U. S. ed. 1. II, 378. (1897); NORTON, Rev. Euphorb. N. Mexico 25. et pl. 26. (1899); DIELS in ENGLER, Bot. Jahrb. XXIX, 430. (Fl. Centr. Chin.) (1901); KOMAROV in Act. Hort. Petrop. XXII, 692. n. 1031. (1903); HAYATA in Journ. Coll. Sci. Tokyo XX-3, 66. et Tab. IV, G. (1904); HALACSY, Consp. Fl. Graec. III, 101. (1904); MAKINO in INUMA, Somoku-Dzusetu rev.

ed. II, 701. pl. 556. (1910); NAKAI in Journ. Coll. Sci. Tokyo XXXI, 184. (Fl. Corea. II.) (1911); Report Veget. Ooryongto 21. (1919); MATSUMURA, Ind. Pl. Jap. II-2, 302. (1912); MORI, Enum. Pl. Corea. 233. (1921); YAMATUTA, List. Mandsh. Pl. 178. (1930).

Tithymalus helioscopius BAUH. Pin. 291. (1623).

Tithymalus Helioscopius (non HILL, Brit. Herb. et Hort. Kew.) SCOPOLI, Fl. Carniol. ed. 2. 337. (1772).

Tithymalus serratus GILIB., Fl. Lituan. II, 207. (1781) (fide Index Kew.)

Galarhoeus helioscopius HAWORTH, Synop. Pl. Succ. 152. (1812); SMALL, Manual South-East. Fl. 802. (1933) est *Galarhoeus helioscopia*; HARA in Journ. Jap. Bot. XI-6, 385. (1935); HONDA, Nomina Pl. Jap. 192. (1939).

Euphorbia japonica (nec BOISSIER nec SIEBOLD) ZOLLINGER ex BOISSIER in DC. l. c. 136. (1862) pro syn. sub *E. Helioscopia*.

Euphorbion helioscopium ST. LAGER in Ann. Soc. Bot. Lyon. VII, 126. (1880) ex NORTON l. c.

Sedum anacampseros (non L.) LOUREIRO, Fl. Cochinch. 287. (1790) ed. WILLD. 352. (1793) fide MERRILL, Comment. LOUR. "Fl. Cochinch." 242. (1935) pro syn. *E. Helioscopiae*.

Euphorbia Helioscopia var. *Corazei* LÉVEILLÉ¹⁾ in Le Monde des Plantes VII, 38. (1906) [in FEDDE, Repert. III, 208. (1906) de planta ex Nice.].

Hab. in Honsyu, Sikoku, Kyusyu (simul ins. Tusima), Corea (simul ins. Quelpaert et ins. Ooryongto), Manshuria, China et per Liukiu-Archipelago ad Formosam.

Distr. Asia orientalis et media, excepta Sibiria septentrionali, et Europa fere tota. Introducta in Americam borealem etc.

Sect. **Helioscopiae** subsect. **Foveospermae**, m. subsect. nov.

3) **Euphorbia Peplus** LINN., Sp. Pl. ed. 1. I, 456. (1753); THUNBERG, Fl. Jap. 196. (1784); WILLD., Sp. Pl. II-2, 903. n. 68. (1799); ATON, Hort. Kew. III, 163. (1811); REICHENBACH, Icon. Fl. Germ. vol. V-8, fig. 4775. (1841); BOISSIER in DC. l. c. 141. (1862); Fl. Orient. IV, 1112. (1879); GRAY, Manual

(1) Haec varietas a LÉVEILLÉ distinguenda est cum caulibus et ramis nec non radiis umbellae longe et albo pilosis. Sed talis forma cum multis formis transitiis etiam in Japonia occurrit.

Bot. ed. 5. 435. (1867); ed. 6. 456. (1889); FRANCH. et SAVAT., Enum. Pl. Jap. I, 442. (1875)¹⁾; BRITTON et BROWN, Illustr. Fl. N. U. S. II, 379. et fig. 2333. (1897); NORTON, Rev. Euph. N. Mexico 29. et. pl. 30. (1899); HAYATA, Icon. Pl. Formos. IX, 103. (1919); MASAMUNE, Short Fl. Formos. 119. (1936).

Peplus s. *Esula rotundata* BAUH. Pin. 292. (1623).

Tithymalus Peplus VAN HALLER, Hist. Stirp. Helv. II, 7. (1768).

Tithymalus rotundifolius LAMARCK, Fl. Franc. III, 100. (1778) (fide NORTON l. c. 29).

Euphorbia n. 87. *Peplus (oleraceus)* PERSOON, Synop. Pl. II-2, 14. (1806).

Esula Peplus HAWORTH, Synop. Pl. Succ. 158. (1812).

Esula minima HAWORTH l. c.

Esula rotundifolia (non LOIS.) S. F. GRAY, Nat. Arrang. Brit. Pl. II. 257. (1821).

Keraselma oleracea RAFINESQUE, Fl. Tellur. IV, 116. (1836).

Keraselma Peplus RAFIN. l. c. (duae supra citatae fide Index Kew.).

Euphorbion Peplum ST. LAGER in Ann. Soc. Bot. Lyon VII, 125. (1880).

Tithymalus Peplus HILL sic SMALL, Fl. South-East. U. S. 720. (1903); BRITTON et BROWN, Fl. Bermuda 217. et fig. 242. (1918).

Galarhoeus Peplus HAW.²⁾ sic SMALL, Manual South-East. Fl. 801. (1933)

Nom. Jap.: *Tyabo-taigeki*, v. *Kidati-nisikiso*.

Hab. in Kyusyu, prov. Hizen, circ. oppid. Nagasaki, Oura. (Y. TASHIRO, Sept. 16, 1892).

Formosa, prov. Taihoku, Tamsui. (TAKIYA KAWAKAMI, Jun. 1907).—Fortasse planta introducta, sed non certum.

Distr. Europa tota (e Suecia et Anglia ad Graeciam et Lusitaniam), Aegyptia, Arabia, Persia et Bermuda-Archipelag. Introducta in Americam borealem.

***Euphorbia* subgen. *Esula* sect. *Esula* (ROEPER ined. ex DUBY).**

Keraselma NECKER, Elem. Bot. II, 353. no. 1154. (1790).

Euphorbia **** *Esula* PERSOON, Synop. Pl. II-1, 14. (1806) p. p.

(1) Franchet dicit "Planta a nullo recentiore inventa, ad unam ex praecedentibus speciebus (*E. Onoei*, *E. Helioscopia* etc.) fortasse referenda." Sed specimina harum plantarum ex Kyusyu et Formosa vidi. (ipse).

(2) But in fact HAWORTH used the generic name *Esula* for *Peplus*. See above.

Galarhoeus HAWORTH, Synop. Pl. Succ. 143. (1812) p. p.

Esula HAWORTH l. c. 153. (1812) p. p.

Euphorbia sect. II. *Tithymalus* TOURN. § 2. *Esula* ROEPER ined. ex DUBY, Bot. Gall. I, 414. (1828)¹⁾.

Euphorbia * *Tithymalus* T. § *Esula* ROEPER ex MUTEL, Fl. France. III, 157. (1836) p. p.

Euphorbia B. *Tithymalus* a. *Galarrhoeus* ex REICHENBACH, Fl. Germ. Excurs. III, 755. (1832) p. p. et b. *Keraselma* NECKER ex REICHB. l. c. 759. (1832).

Euphorbia sect. II. *Tithymalus* ex KOCH, Synop. Pl. Germ. & Helv. 627. (1837) p. p. et sect. III. *Esula* ROEPER apud DUBY, Bot. Gall. 114. sic KOCH l. c. 630. (1837) p. p.; LEDEB., Fl. Ross. III. fasc. X, 558. sect. *Tithymalus*. p. p. et l. c. 569. sect. *Esula*. p. p. (1850) omnis ut in KOCH.

Euphorbia Tithymalus § 9. *Galarrhoei* BOISSIER in DC. l. c. 113. (1862) pro maxim. parte.; Fl. Orient. IV, 1095. § 6. (1879) p. p., i. e. tantum "Semina laevia."; PAX in ENGLER, Pflz.-fam. III-5, 110. (1896) p. p.; PAX et K. HOFFMANN in ENGLER, Pflz.-fam. ed. 2. 19. c. 219. (1931) excl. minim. par.

Euphorbia sect. *Tithymalus* § 10. *Esulae* BOISSIER in DC. l. c. 138. (1862) pro maxim. parte.; Fl. Orient. l. c. 112. § 7. (1879) tantum "Semina laevia." i. e. excl. *E. Peplus*, *E. exigua* etc.; PAX in ENGLER l. c. 110. (1896) p. p.; PAX et K. HOFFMANN in ENGLER l. c. 220. (1931) p. p., i. e. tantum "Samen glatt."

Euphorbiopsis LÉVEILLÉ in FEDDE, Repert. IX, 466. (1911).

Sect. **Esula** subsect. **Verticillatae** subsect. nov.

Euphorbia sect. *Tithymalus* § 9. *Galarrhoei* BOISSIER in DC. l. c. 113. (1862) tantum *E. Pallasii* TURCZ.; PAX et K. HOFFMANN in ENGLER l. c. 219. (1931).

Folia caulium fertilium superiora verticillata ut in umbellaribus. Folia omnia majora firma subcoriacea. Umbella saepissime 5-radiata, radiis primo vulgo 3-fidis dein bifidis. Bracteolae inter flores masculinos saepe obsoletae. Semina laevia.

(1) in ROEPER, Enum. Euphorb. Germ. et Pann. 59. (1824) in sequenti modo scriptur sine nominibus sectionalibus propriis: *Euphorbia* II. exstipulatae, processibus membranaceis nullis sub involueris glandulis, seminibus caruncula arillari instructis,

A.) Glandulae involueri cotyledonesque embryonis suborbiculatae; et

B.) Glandulae involueri triangulares, lunatae etc., cotyledones lineares. l. c. 63.

Typus: *Euphorbia Fischeriana* STEUDEL.

5) ***Euphorbia Fischeriana*** STEUDEL, Nomencl. Bot. ed. 2.^a I, 611. (1840)
nom. nud.

Euphorbia (Tithymalus) no. 4. GMELIN, Fl. Sibir. II, 230. (1749) excl. syn.

E. verticillata (nec ORPHANIDES, nec POIRET, nec DESFONTAINES.) FISCHER
in Mém. Soc. Natur. Mosc. III, 81. (1812).

E. macrorrhiza (non C. A. MEYER) PALLAS (in JACQ. herb.) ex LEDEB. l.c.

Euphorbia Pallasii TURCZANINOW in Bull. Soc. Imp. Natur. Mosc. XI, 100.
no. 1004. (Catal. Pl. Reg. Baic. Dah.) (1838) nom. nud. et in Bull. l. c. XXVII,
pt. 2. 358. no. 1006. (1854) cum diagn.; LEDEB., Fl. Ross. III. fasc. X, 565.
(1850); REGEL in Mém. Acad. Imp. Sci. St. Petersb. VII. sér. IV. no. IV. 128.
n. 425. (Tent. Fl. Ussr.) (1861); BOISSIER in DC. l. c. 114. (1862); Icon.
Euph. t. 62. (1866); MAXIM. in Mém. Biol. XI, 833. (1883); KORSCHINSKY in
Act. Hort. Petrop. XII, 385. (1892); FORBES et HEMSLEY in Journ. Linn. Soc.
XXVI, 415. (1894); KOMAROV in Act. Hort. Petrop. XXII, 686. (1903); MORI,
Enum. Pl. Corea. 233. (1921); YAMATUTA, List Manch. Pl. 179. (1930);
KOMAROV et KLOBUKOVA-ALISOVA, Key far east. reg. Ussur. 706. (1932).

Galarhoeus Pallasii HATSUSHIMA, Prelim. Rep. Pl. Hokusen Exper. For. Kyu-
syu Imp. Univ. no. 10. 86. (1938).

Descrip.: glabra (var. *glaberrima* MAXIM.) vel pilosa (var. *pilosa* REGEL).
Rhizoma valde incrassatum, unde caulis vulgo unicus enascatur, caule satis
incrassato simplici vel superne ramuloso, ramulis fere semper sterilibus foliosis,
inferiore foliis squamatis dense obtecto.

Umbella 5-radiata, radiis primo 3-fidis dein semel vel bis bifidis. Folia
integra sessilia subcoriacea, caulium sterilium saepe angustiora oblongi- vel
lineari-lanceolata excepta, ovato-elliptica obtusa superiora caulium fertilium
verticillatim quattuor vel quinque uti umbellaria conferta; umbellaria breviora
basi truncato-obtusa subcordata plus minus triangulari-oblonga; floralia
rhombeo- vel triangulari-ovata basi subcordata apice obtusa mutica.

Involucra hemisphaerica extus glabra vel sparsius pilosa intus sub glandulis
dense pilosa, 4-glandulifera, glandulis laterali ovatis vel oblongis utrinque sub-
auriculatis, lobis 5 ovatis integris margine toto fimbriatis, bracteolis inter flores
masculinos valde abbreviatis saepe obsoletis vel subnullis. Ovarium sublaeve

non profunde 3-sulcatum glabrum vel sparse pilosum. Capsula matura rugulosa. Styli 3 basi dimidio coaliti, stigmatibus tenuibus paulum vel haud bifidis. Semina laevia, plus minus laterali-compresso-ovata, carunculis depresso-conicis.

var. **glaberrima** m. comb. nov.

Euphorbia Pallasii var. *glaberrima* MAXIM. l.c. 834. (1883); KORSCHINSKY l.c. 385. (1892); KOMAROV in Act. Hort. Petrop. l.c. 687. (1903).

Caulis et folia tota glabra, sed involucra utrinque saepius et capsula rarius pilosa.

Hab. in Manshuria, prov. Fengtien, Penhsihu. (Honkei-ko) (ZYUNPEI SATO, Maj. 21. 1928.); prov. Khingan, Irikute. (OMI YAMATUTA, Jul. 16. 1928.); prov. Khingan, in montibus Khingan. (MASAO KITAGAWA, Jul. 30. 1930.); ibid., Solon.* (MASAO KITAGAWA, Aug. 1. 1935).

var. **pilosa** m. comb. nov.

Euphorbia Pallasii TURCZ. var. *pilosa* REGEL l.c. no. 425. (1861); MAXIM. l.c. 834. (1883); KORSCHINSKY l.c. 385. (1892); KOMAROV l.c. 687. (1903).

Planta juvenilis caule densius et foliis sparsius longe pilosis, sed interdum parce glabriusculis; involucrum et capsula vulgo pilosum vel glabrescens.

Inter varietates duas supra scriptas, differentias proprias non observavi.

Hab. in Manshuria, prov. Austro-Ussur. (KOMAROV, Maj. 26. 1896.); prov. Chien-tau, in monte Ma-an-shan. (KAZUMA ZYO.)

Distr. species. Manshuria, Dahuria, Ussuri et Corea australis.

(Continuatis sequitur.)